Modeling the Shock Acceleration and Heliospheric Transport of Solar Protons with SPREAdFAST

KAMEN KOZAREV[1], ROSITSA MITEVA[1], MOMCHIL DECHEV[1], PIETRO ZUCCA[2]
[1]*Institute of Astronomi and National Astronomical Observatory, Bulgarian Academy of Sciences*
[2]*ASTRON, The Netherlands Institute of Radio Astronomy*
E-mail: kkozarev@astro.bas.bg

We present the project SPREAdFAST – Solar Particle Radiation Environment Analysis and Forecasting - Acceleration and Scattering Transport, as well as recent updates to the modeling and forecasting framework. This investigation fulfills a vital component of the space weather requirements of ESA's Space Situational Awareness program by contributing to the capability to protect space assets from solar activity space radiation. It will allow for producing predictions of SEP fluxes at multiple locations in the inner heliosphere, by modelling their acceleration at Coronal Mass Ejections (CMEs) near the Sun, and their subsequent interplanetary transport using a physics-based, data-driven approach. The system prototype will incorporate results from our scientific investigations, the modification and linking of existing open source scientific software, and its adaptation to the goals of the proposed work. It will incorporate a chain of data-driven analytic and numerical models, for estimating: coronal magnetic fields; dynamics of large-scale coronal (CME-driven) shock waves; energetic particle acceleration; scatter-based (not simple ballistic), time-dependent SEP propagation in the heliosphere to specific time-dependent locations.